# Learning with Polyphony: AmpDamp

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## Abstract

With exponential increases of information flows on social media platforms, user experiences have become fragmented, cacophonous, and often overwhelming. Such "noise" makes learning on these platforms difficult. By contrast, the principle of polyphony frames learning with social media as a graceful, intentional threading together of multiple voices. In this paper we describe AmpDamp, a design concept for orchestrating polyphony in social media environments. Connecting a physical knob to a browser extension, AmpDamp translates the gestures of turning up (amplifying) and turning down (dampening) into a dynamic orchestration of the "volume" of a user's social media feed. By focusing on issues of granularity and temporality, we position polyphony as an entry point into incorporating the values of control and curation into learning experiences using social media.

*Keywords:* polyphony, design, values

## Introduction

With exponential increases of information flows on social media platforms, opportunities and sites for peer-based, informal learning abound. However, as information streams become floods, information competes for our limited attention and user experiences have become fragmented and often overwhelming. In this chaotic information environment, leveraging social media to establish and support informal learning proves increasingly difficult.

The issue here, and the motivation for our design exploration, is that current binary options of control over social media render users' preferences as static configurations. Web services such as Facebook and Google enable hiding or viewing streams of content, while other curation tools use algorithms to condense content based on user-designated interests. Microblogging platforms such as Twitter barrage users with an unmediated stream of temporally organized content, ignoring volume or relations between a user and her network. By offloading choice to algorithms, these mechanisms force users into preferences that lack social nuance. We believe that such tools are inadequately flexible to support the wide range of situations and communities where informal learning occurs.

In order to better harness the interactivity and engagement afforded by social media platforms, we propose AmpDamp, a conceptual interface that gives users a range of filtering options for modulating Twitter streams in real time and across contexts. By doing so, AmpDamp supports users' efforts to more effectively learn from their social networks. In creating AmpDamp we have foregrounded the concept of polyphony as a design principle. The metaphor of polyphony, taken from the arts, offers a lens through which we address questions of control and curation in informal, social learning environments.

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## From Polyphonous Works to Polyphonous Design

Polyphonous works are compositions that incorporate multiple voices without the presence of an authoritative voice. In polyphonous music or literature, instrumental or textual voices are interwoven throughout a composition while remaining rhythmically and melodically autonomous. Bakhtin (1984) argues that in literature, "the essence of polyphony lies precisely in the fact that the voices remain independent and, as such, are combined in a unity of a higher order than in homophony [...] the artistic will of polyphony is a will to combine many wills, a will to the event." In foregrounding polyphony as a value in design, we follow Bakhtin in his metaphorical use of polyphony. Bakhtin argues that polyphony offers a powerful metaphor to draw our attention to new challenges–from navigation to interpretation–that emerge when narrative expands beyond a normative monologic unity or when a musical composition features multiple simultaneous voices. Social media platforms present a parallel challenge, as they create noisy information environments for users; existing tools for managing content are inadequate to deal with the presence of a wide range of voices, rhythms, and volumes in a nuanced way.

As a framing metaphor, polyphony recasts the information overload problem as a question of how a diversity of voices may co-exist in real time. We offer an alternative to the formal, algorithmic, and static filtering of information streams by enrolling the user as an active participant in the dynamic modulation of her own experience. In doing so we locate our work within a community of interdisciplinary scholars focused on accounting for the role of human values in the design and use of socio-technical tools or systems; work in this space includes *reflective design* (Sengers et al. 2005) or *values in design* (Nissenbaum 1998, Flanagan et al. 2005). Sengers and Gaver (2006) argue for a nuanced, reflective understanding of design and use, one which eschews a single preferred interpretation of the functions of a given interactive system in order to acknowledge the co-existence and legitimacy of multiple - even competing - interpretations. What we're calling *polyphonous design* argues for the need to design with polyphony as a guiding value and further to design flexibly, in support of multiple unspecified outcomes. Polyphonous design moves away from the idea of optimizing on a value such as polyphony or tightly engineering a polyphonous experience; rather than designing to produce polyphony, our work aims to enable a user to experience it.

## Learning with Social Media

Learning with social media can happen in many different ways. Many researchers agree that informal, or learner-directed, actions on social media platforms can enhance and support in-classroom instruction (Dunlap & Lowenthal 2009, Richardson & Swan 2003). Most research that aims to facilitate learning with social media focuses on engaging learners to participate in an online conversation. However, moving outside of classroom settings there is little research that engages with how independently motivated users navigate social media content streams and learn from them in context.

The primary way a user encounters new social media content is by reading news feeds; these content streams are at times crowded with many competing voices or at other times quiet, based on the current happenings in a user's network. Networks, in turn, vary across contexts and relationships, from friends and family to colleagues and professional acquaintances to entertainment and news. Each community in which a user actively participates adds social data. Parsing meaning from these diverse information sources requires a considerable amount of attention in order to contextualize content.

In both structured and informal settings, the value of attention—separating signal from noise, focusing on specific elements of the environment—grows as information is produced and circulated in new and unpredictable ways online. At the same time, a user's ability to pay attention is strained by the scale, speed, or medium of information engagement. In social media contexts, where both time and attention are limited, tools for filtering the online experience are key to both targeted information search and serendipitous learning opportunities. Dunlap and Lowenthal (2009) argue that social media tools such as Twitter facilitate informal and just-in-time interactions that support and often extend traditional classroom-based learning. However, the control mechanisms we have for managing these timely social interactions are limited and do not sufficiently support varying levels of engagement.

## Listening to Social Media

Crawford (2009) has written extensively on "listening" as a metaphor for considering "the nuances of connection and communication" afforded by online social media platforms. Crawford describes three modes of listening online: reciprocal, background, and delegated. Reciprocal listening implies a conversational approach, such as responding to @mentions or requests. Delegated listening outsources bits of attention to automated listening "assistants" such as news alerts. Finally, Crawford compares background listening to the ambient noise of the radio, with the lowest level of attention possible. Crawford argues that it is important to pay attention to the labor inherent in listening. Important to Crawford's argument is that boundaries between these different kinds of listening - and the degrees of attention they require - are fluid, and users are likely to switch between modes throughout the day.

## Polyphonous Design: Learning with AmpDamp

AmpDamp is a proof-of-concept for enabling the experience of polyphony in social media environments. Current binary options in social media interfaces (follow/unfollow, mute/unmute) fail to provide sufficient granularity for a user to manage the nuanced voices and rhythms in her social media streams. By combining hardware (a knob) with software (a browser extension), we propose a design to increase the granularity and temporal modularity of social media interfaces.

For example, Jan is a recent college graduate who has just gotten her first job as a programmer for a large technology company. Her new position requires knowledge of Javascript, a programming language she is just beginning to learn. After attending a Javascript meetup, Jan adds several new acquaintances—all of whom already know each other—to her Twitter feed. One of them, John, tweets a lot of interesting and useful links about Javascript. Unfortunately, he also tweets a lot of images of his cat, Felix, and engages in cat-related conversations with his programmer friends that appear as extended inside jokes to an outsider such as Jan. While Felix is quite charming, his near ubiquitous presence on Jan's Twitter feed challenges both her motivation and ability to use John's knowledge as a Javascript learning tool. The situation is further complicated by the fact that John tends to tweet Javascript-related material during traditional work hours, spending his non-working hours chronicling Felix's movements; by contrast, Jan focuses her Javascript learning efforts on the evenings and weekends. Jan is left with few options: unfollow John and his friends and miss an opportunity to learn more about Javascript, or continue following John and try to ignore the copious cat pictures. The problem here is filter failure; Twitter's current filtering features are too coarse to accommodate the dynamic nature of human interaction (Shirky 2008). On one hand, Jan learns a lot from reading the links about Javascript programming in her feed. On the other, sometimes useful information gets lost in a sea of cat-stagrams. What Jan needs is a tool to manage the voices in her stream that allows for varying levels of control and that recognizes that her preferences change over time. This example highlights two primary design concerns for supporting informal learning through social media interfaces, addressed in depth below.

First, *the granularity of control in social media interfaces is too coarse to harness the affordances of social media in support of peer-based learning.* Classroom-based learning tends to be structured, controlled, and formal; attention is focused on a single speaker, or on the linear progression of an ordered conversation among several voices. By contrast, learning in social media environments tends to be unstructured, opportunistic, and informal, with a multitude of voices present at any given time. As illustrated in the example above, binary control choices within existing platforms (on/off, follow/unfollow, mute/unmute) occlude a vast horizon of possible interactions and mute the dynamism of social media environments. As a proof-of-concept, AmpDamp consists of a variable resistor sending input to a custom Chrome extension through an Arduino microcontroller and locally running webserver. When a user visits Twitter.com our extension maps the knob's signal to the CSS opacity and zoom attributes of DOM elements matching selected Twitter usernames or hashtags. This first instantiation functions as a very rough proof-of-concept operating only on Twitter, with custom built knobs and hard-coded selections. Our next iteration uses commercial knobs, eliminates the local web server (using Chrome's USB API), and permits dynamic user selection of features for manipulation (e.g. usernames, hashtags, keywords).

Second, *social media users' listening needs and preferences change dynamically.* When listening to the radio, a user modulates volume depending on the content of a broadcast or its relevance to what else she happens to be doing. In order to address the temporal dynamics of user needs and control preferences with respect to social media, we introduce a similar mode of interaction through the

combination of a physical knob and a contextually aware browser extension. This analog volume control knob provides a "natural" mapping between a physical action (twisting and turning dials) and an effect within a social media context, enabling users to quickly and easily modulate their Twitter streams using a deeply familiar interactional modality. The knob communicates user actions to the browser extension via USB, and the extension combines that input with contextual information based upon the currently active social media platform. This design enables the user to modulate social media preferences on the fly without the cumbersome work of configuring rules, profiles, or triggers. The design emphasizes the *active* and *ongoing* modulation of a user's social media environment over pre-configured sets of rules.

While dampening cat pictures might seem like a trivial example, it is meant to highlight the fact that AmpDamp's functionality is 1) user configurable and 2) context dependent. Furthermore, behavior may be fully customizable through a plug-in system. As designers, we do not want to dictate the repercussions of "amplify" or "dampen." Rather, we want to enable users to construct those meanings themselves, and to adjust them over time and situations. Because we are still in the early stages of development and implementation, we continue to consider questions about how filtering criteria – and specifically the complex set of joint conditional probabilities that may arise in use – can be addressed technically. To this end, we plan to supplement our preliminary, paper-based user testing with further prototyping and user research; topics will include exploring how users navigate and cognitively manage multiple information needs and filtering criteria, and identifying specific learning heuristics and levels of control granularity that users desire or find lead to meaningful learning experiences.

## Conclusion

We have created AmpDamp through an iterative process of design exploration, prototyping, and user research. By modulating social media voices with a hardware knob, AmpDamp addresses the inherent challenges of designing for, and with, polyphony within the scope of social media. Polyphony provides a rich entryway for designers to rethink the experience of social media platforms such as Twitter; further, it creates a space for physical control tools that may better reflect values such as granularity, temporality, and dynamic situational specificity.

We believe that by giving a different kind of control to users, AmpDamp can foster self-directed learning as well as promote a conscientiousness toward curation that current social media platform controls do not afford. By drawing attention to the often invisible work of filters and algorithms, we reposition filtering in terms of ongoing practice. Instead of trying to optimize around a concept (such as polyphony) or offload preferences to preconfigured technological artifacts, AmpDamp allows users to improvise and learn from their social networks in novel ways and in real time. Moreover, this reframing causes meaningful reflection on what values within social media might best support informal, peer-based learning. This final point–that we seek to foster active reflection on values at the point of design as well as in use–provides a direction for thinking about social media as a platform to support ongoing learning.

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